

CHAPTER 1C

PREPARING FOR INSTALLATION

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1C.1.0 INTRODUCTION

The following items must be taken into consideration before installing your generator. These items will impact the services required:

- Power level of your generator.
- Power line requirements.
- Ground requirements.
- Physical placement of the generator.
- Environmental requirements for the generator.
- Cable runs from the generator to all room components: X-ray tubes, tables, Bucky's, AEC, DAP and other room equipment.

1C.2.0 GENERATOR POWER REQUIREMENTS**1C.2.1 50 kW Three Phase 400 / 480 VAC**

Line Voltage	400 VAC \pm 10%, 3~ 480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	100 Amps/phase at 400 VAC. 80 Amps/phase at 480 VAC.
Standby Current *	< 0.5 Amps.

1C.2.2 65 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~ 480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	125 Amps/phase at 400 VAC. 105 Amps/phase at 480 VAC.
Standby Current *	< 0.5 Amps.

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1C.2.0 GENERATOR POWER REQUIREMENTS (Cont)**1C.2.3 80 kW Three Phase**

Line Voltage	400 VAC \pm 10%, 3~
	480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	155 Amps/phase at 400 VAC. 130 Amps/phase at 480 VAC.
Standby Current *	< 0.5 Amps.

1C.2.4 100 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~
	480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	195 Amps/phase at 400 VAC. 160 Amps/phase at 480 VAC.
Standby Current *	< 0.5 Amps.

* Standby Current: This is the current that the generator draws when it is "idle", i.e. with the generator switched on and the filaments at standby level.
External or installer-supplied equipment connected to the generator may increase the standby current beyond the values shown.

NOTE: THE FOLLOWING TABLE CONTAINS RECOMMENDED VALUES FOR THE WIRE SIZES BETWEEN THE MAINS DISCONNECT AND THE GENERATOR. THE ACTUAL VALUES USED AT AN INSTALLATION ARE DEPENDENT ON THE QUALITY OF THE INPUT LINE (VOLTAGE LEVEL), THE CURRENT REQUIREMENTS, THE LENGTH OF THE CABLE RUN, AND MUST BE CONFIRMED BY THE INSTALLER.

FINAL SELECTION OF GENERATOR INPUT WIRE AND DISCONNECTS, AS WELL AS THE CABLING FROM THE DISTRIBUTION TRANSFORMER TO THE MAINS DISCONNECT MUST MEET THE REQUIREMENTS OF THE LOCAL ELECTRICAL CODES AND IS USUALLY DETERMINED BY HOSPITAL / CONTRACTOR ENGINEERING.

ALL LISTED RATINGS CONSIDER THE GENERATOR REQUIREMENTS ONLY. THE INSTALLER MUST MAKE THE NECESSARY COMPENSATION FOR ADDITIONAL LOADS.

A POOR QUALITY INPUT LINE MAY RESULT IN THE INSTALLER HAVING TO DERATE THE GENERATOR'S MAXIMUM POWER

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1C.2.0 GENERATOR POWER (AC MAINS) REQUIREMENTS (Cont)

Mains Voltage	Minimum Recommended Mains Disconnect to Generator 15 ft/5 m max)	Generator Momentary Line Current	Minimum Recommended Generator Service Rating	Minimum Recommended Distribution Transformer Rating	Minimum Recommended Ground Wire Size	Apparent Mains Resistance
50 kW 3~ Generator						
400 VAC	#6 ** (13.3 mm ²)	100 A	100 A	65 kVA	#6 (13.3 mm ²)	0.17 Ω
480 VAC	#6 ** (13.3 mm ²)	80 A	100 A	65 kVA	#6 (13.3 mm ²)	0.24 Ω
65 kW 3~ Generator						
400 VAC	#6 *** (13.3 mm ²)	125 A	100 A	85 kVA	#6 (13.3 mm ²)	0.13 Ω
480 VAC	#6 *** (13.3 mm ²)	105 A	100 A	85 kVA	#6 (13.3 mm ²)	0.19 Ω
80 kW 3~ Generator						
400 VAC	#6 *** (13.3 mm ²)	155 A	100 A	105 kVA	#6 (13.3 mm ²)	0.11 Ω
480 VAC	#6 *** (13.3 mm ²)	130 A	100 A	105 kVA	#6 (13.3 mm ²)	0.15 Ω
100 kW 3~ Generator						
400 VAC	#4 *** (21 mm ²)	195 A	100 A	130 kVA	#4 (21 mm ²)	0.09 Ω
480 VAC	#6 *** (13.3 mm ²)	160 A	100 A	130 kVA	#6 (13.3 mm ²)	0.12 Ω

- All wiring and grounding must comply with local electrical codes.
 - * Maximum size for the ground wire is #2 AWG (33 mm²).
 - * ** Maximum wire gauge is #4 AWG (21 mm²).
 - * *** Maximum wire gauge is #2 AWG (33 mm²).
- All wiring must be copper.
- The main disconnect switch shall be located within reach of the operator.

1C.2.5 Service Disconnect (All Models)

Refer to the previous table for the recommended service disconnect ratings for the Indico IQ™ series of X-ray generators.

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1C.3.0 GROUND REQUIREMENTS

POWER LINE:

- A suitable ground must be connected from the main disconnect switch to the main ground connection on the generator, located below the input distribution board. The ground wire is typically part of the line cord, and the current capacity of the ground conductor must be equal to or greater than that of the line conductors.
- If a neutral line is provided with the system, under no circumstances is it to be used for ground purposes. The ground conductor only may carry fault currents.

X-RAY TUBE HOUSING:

- A copper ground cable, #10 AWG (6 mm²) or greater, is to be connected from each X-ray tube's housing to the HV module's ground stud located at the top of the HV module.

STATOR CABLE:

- For units with a low speed starter, shielded stator cables are recommended.
- For units with a dual speed starter, shielded stator cables **MUST** be used.
- The shield for the stator cable(s) must be properly grounded at both the tube and the generator ends of the cable(s).
- The stator cable must be rated for the highest working voltage, 600 VAC is recommended.

1C.4.0 GENERATOR DIMENSIONS AND WEIGHT

1C.4.1 Generator Outline

Refer to chapter 1A for the Indico IQ™ generator outline.

1C.4.2 Generator Weight

The weight of the generator cabinet and of the available consoles is listed below:

Generator cabinet with HT tank	200 lbs (91 kg).
R&F membrane console	8 lbs (3.7 kg).
15" Touchscreen console	18 lbs (8.2 kg) - with base 10 lbs (4.5 kg) - without base
19" Touchscreen console	21 lbs (9.5 kg) – if CPI desk mount kit is used p/n 2990041300 12 lbs (5.5 kg) – if using the <i>built-in</i> stand

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1C.4.3 Generator Shipping Pack

The dimensions of the packed Indico IQ™ X-ray generator are shown in the table below.

ITEM	LENGTH	WIDTH	HEIGHT	WEIGHT
Main cabinet in shipping pack	28 in (71 cm)	24 in (61 cm)	52 in (132 cm)	* 240-260 lbs (109-118 kg)

* The packed weight of the generator will vary within the specified range depending on console type and options.

1C.5.0 LOCATING THE GENERATOR CABINET AND CONTROL CONSOLE

WARNING: ENSURE THAT NO EQUIPMENT, BOXES, TOOLS, OR ANY TYPE OF LIQUIDS OR ITEMS ARE PLACED ON TOP OF THE GENERATOR CABINET, AND THAT THE GENERATOR CABINET IS NOT SUBJECTED TO EXTERNAL FORCE UNDER ANY CIRCUMSTANCES.

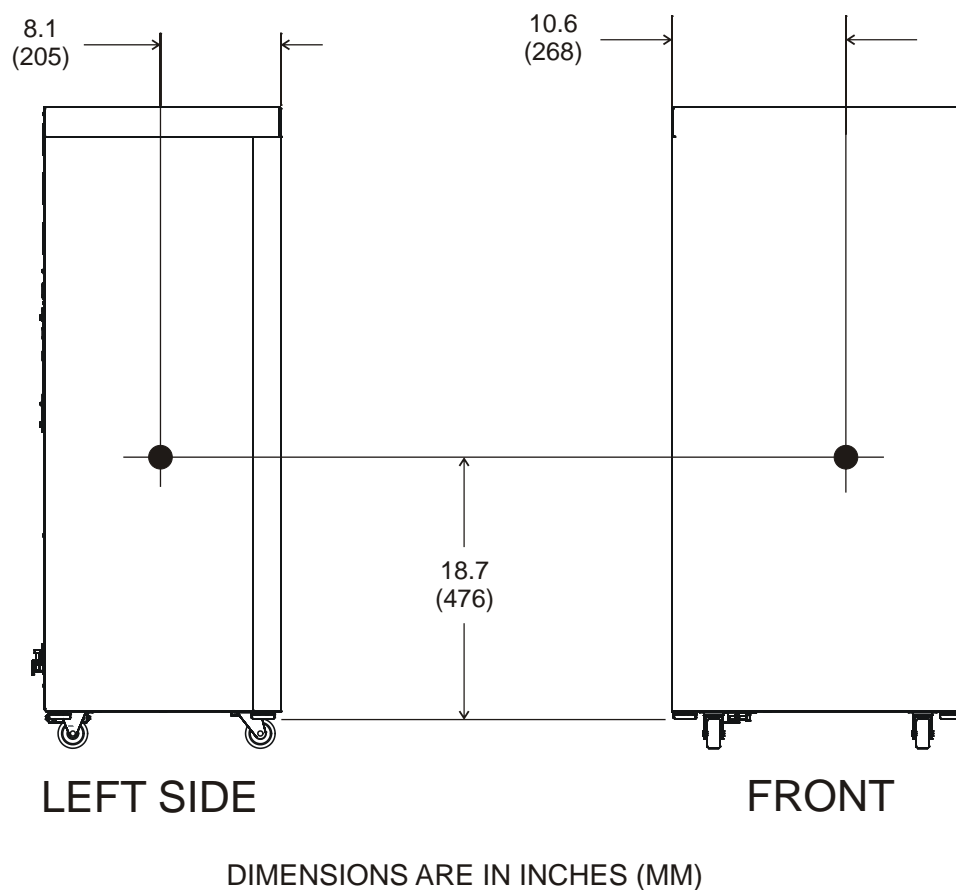
The generator cabinet is self-standing and does not need to be supported. However, the installation should meet the following requirements:

- The floor must be flat and level.
- The generator installation area must be dry, clean and free of dirt or debris. Precautions should also be taken such that there is no chance that water or any type of liquid enters the generator or control console, before, during and after installation, and within the entire generator's or control console's service life.
- Mounting holes have been provided in the base of the generator to secure the generator to the floor, if required. Alternately, the generator may be anchored to the floor via installer supplied hold-down brackets. Refer to ***Seismic Centers and mounting hole locations*** for further details.
- Sufficient room must be provided to allow access to the generator for installation. Sufficient clearance must also be provided around the generator to allow for safe service and maintenance. A minimum of 42 inches (1.07 m) clearance is recommended on all sides for which service access may be required. This is to minimize the risk of accidentally contacting high voltage during service and maintenance.
- A minimum of 3 inches (76 mm) of clearance is required between the back of the generator and any wall behind the generator.
- Cable conduits, troughs or raceways should be provided to route cables from the generator cabinet to the console and to the room equipment if required. These should be large enough to allow the cables to be routed without risk of damage.
- The control console is normally free standing on a desk or shelf. It may be anchored if necessary. An optional floor stand is available for the R&F membrane console.

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1C.5.1 Seismic Centers and mounting hole locations

Figure 1C-1 shows the seismic center location for the Indico IQ™ X-ray generator. The generator should normally be secured to the floor via the 1/2 inch (13 mm) diameter clearance holes that are located in the base of the cabinet as shown in Figure 1C-2.



IndicoIQ_seismic.cdr

Figure 1C-1: Indico IQ™ seismic centers

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1C.5.1 Seismic Centers and mounting hole locations (Cont)

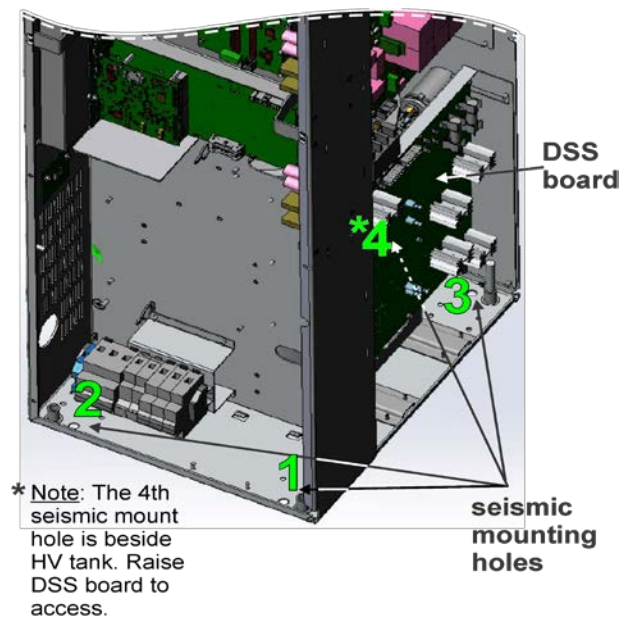
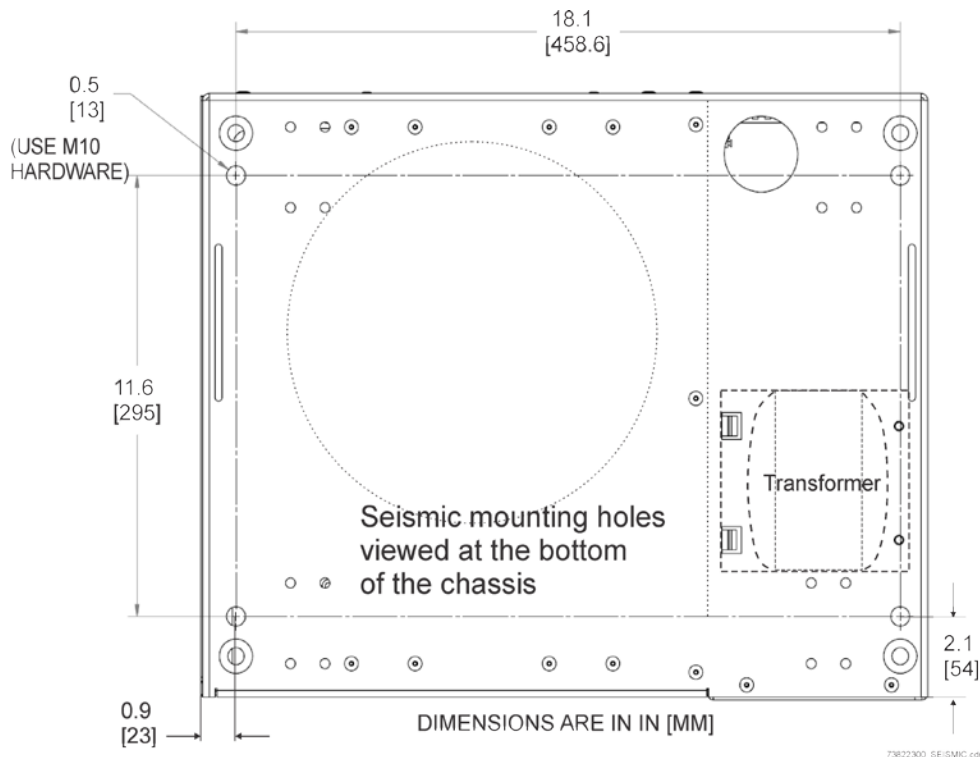


Figure 1C-2: Holes in base of cabinet for securing the generator

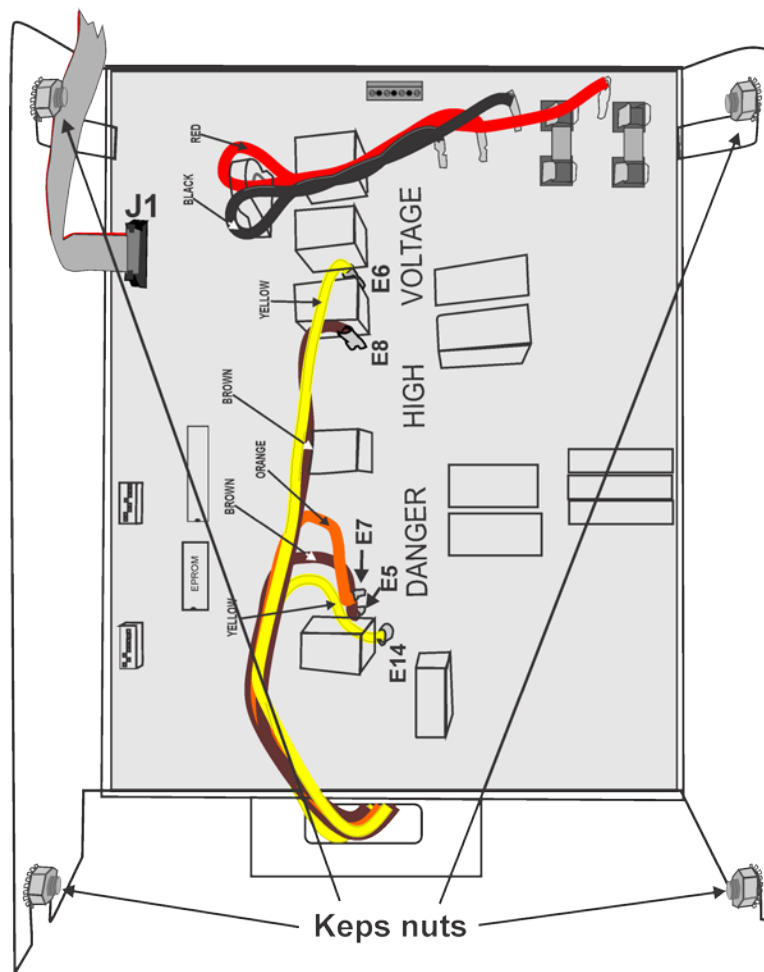
Seismic holes are provided as indicated in Figure 1C-2. Depending on your installation requirement, these holes can be used if seismic mounting is necessary. The customer has to provide the hardware required to secure the generator to the floor. The recommended diameter of the mounting hardware (such as the mounting bolt) is 10 mm of sufficient length so the generator assembly is properly secured.

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1C.5.1 Seismic Centers and mounting hole locations (Cont)

When mounting for seismic consideration, all mounting holes should be utilized. All of them are easily accessible, with one of the holes marked number 4 in the figure, located behind the high voltage tank and can be reached by following this procedure:

- **Follow all safety procedures outlined in this manual before commencing any work on the generator.**
- Loosen but DO NOT remove the four (4) Keps nuts on the DSS mounting plate using 8mm socket or hex driver.



DSS_plate_pull_remove.cdr

Figure 1C-3: Locations of Keps nuts holding the dual speed starter mounting plate to the chassis

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1C.5.1 Seismic Centers and mounting hole locations (Cont)

- Push the dual speed starter mounting plate slightly up, to free the bottom part of the plate from the unit. **Important: Make sure all cables connected to the dual speed starter board do not get pinched, pulled or damaged when moving the mounting plate. If necessary, unplug them from the board.**
- Once the bottom part of the mounting plate is free, swing the dual speed starter board mounting plate away from the unit then up, to access the seismic mounting hole beside the high voltage tank. See figure.

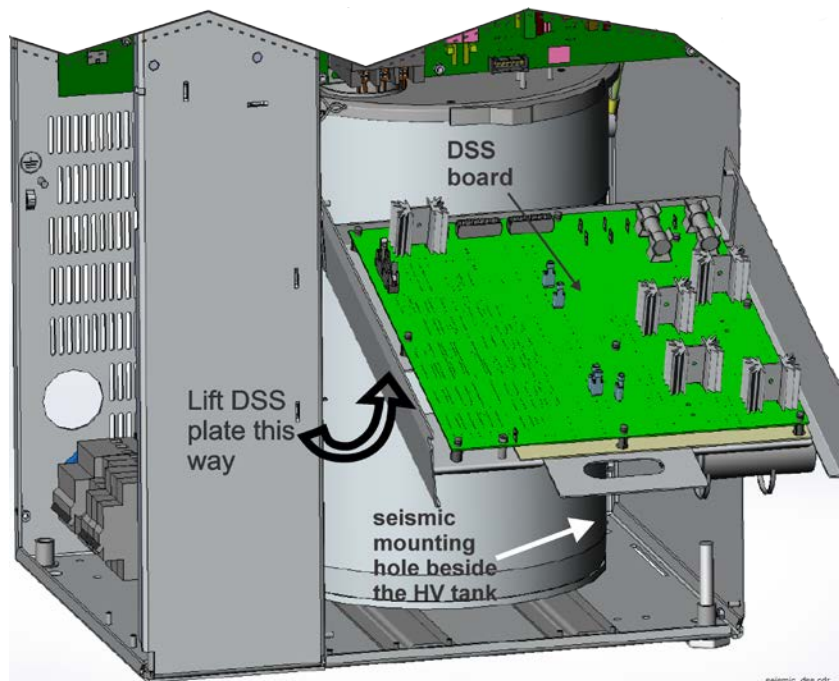


Figure 1C-4: Lift the dual speed starter board mounting plate upwards to access the seismic mounting hole

- The mounting plate needs to be held securely in the position shown in Figure 1C-4 while the seismic mounting hardware is secured.
- When done, slide the dual speed starter board mounting plate back into place. Check that the washers under the keps nut are not caught between the dual speed starter board mounting plate and the generator chassis.
- If cables were removed earlier, plug them all back to their proper locations.
- Secure and tighten the hardware and check that all connections are tight.

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1C.6.0 COOLING REQUIREMENTS

Listed below are the cooling requirements for the Indico IQ™ series X-ray generator:

- The main generator cabinet is fan cooled; and the console is convection-cooled.
- Unrestricted airflow [minimum 3 inches (76 mm)] must be provided at the back of the generator cabinet.
- The console and generator cabinet should never be covered when the generator is switched on, as any covering may interfere with the cooling.
- The maximum heat output of the generator is approximately 22 watts (75 BTU / hour) during standby and approximately 1025 watts (3500 BTU / hour) during fluoroscopic operation. The heat output of the console is less than 30 watts (100 BTU / hour).

1C.7.0 PRE-INSTALLATION CHECK LISTS

The following checklists are provided to help the installer during the pre-installation phase.

1C.7.1 Tools and test Equipment Required

The following is a checklist of recommended tools and test equipment for installation and calibration of the generator.

CHECK <input checked="" type="checkbox"/>	DESCRIPTION
<input type="checkbox"/>	A laptop with a suitable browser (Internet Explorer 9 or higher or Mozilla Firefox 3.6 or higher) is needed for setup and calibration. A suitable length of CAT-5 Ethernet cable will be needed to connect the computer to the generator.
<input type="checkbox"/>	General hand tools for installation: Wrenches, nut drivers, assortment of screwdrivers, pliers, etc.
<input type="checkbox"/>	If the generator is to be anchored to the floor, suitable tools (i.e. drill, drill bits, etc) and mounting hardware must be available.
<input type="checkbox"/>	A supply of connectors for wiring: terminal lugs, caps, splices etc.
<input type="checkbox"/>	A calibrated DVM that indicates true RMS voltages.
<input type="checkbox"/>	Dual trace memory oscilloscope with a minimum 20 MHz bandwidth; appropriate leads, probes, etc.
<input type="checkbox"/>	Device for measuring true kVp. This may be a Dynalyzer equivalent or a non-invasive meter such as the Keithley TRIAD system.
<input type="checkbox"/>	A calibrated radiation meter with detectors that will allow for uGy and Gy/min measurements.
<input type="checkbox"/>	A suitable mA / mAs meter.
<input type="checkbox"/>	A strobe or reed type tachometer to verify that the anode is rotating up to speed.
<input type="checkbox"/>	A sufficient selection of absorbers to allow AEC calibration if this option is fitted. A suggested selection is Lexan in thickness of 5.0, 10.0, and 15.0 cm or water in plastic containers of homogenous density in thickness of 5.0, 10.0 and 15.0 cm.
<input type="checkbox"/>	Test phantoms to verify the imaging systems (if applicable) with the generator.
<input type="checkbox"/>	Vapor proof compound for the HT terminations.

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1C.7.2 Site Logistics

Before starting the generator installation, review the following checklist.

CHECK ✓	DESCRIPTION
	Is there an unloading area to transport the generator from the delivery truck to the inside of the building?
	If the installation is not on the same floor as the delivery entrance, is there an elevator available?
	Is there a transport dolly or similar device to move the generator?
	Do any regulatory bodies need to be notified before installation?
	If movers are required, have arrangements for time and equipment been completed?
	Are lifting straps or some other suitable device available to lift the generator off the shipping pallet?

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